Florida Department of Transportation

US 301 (SR 35) PD&E Study

Location Hydraulic Report

FINAL

FDOT Office
District Five

Authors
Inwood Consulting Engineers, Inc.

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The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration and FDOT.

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Location Hydraulic Report
US 301 Project Development and Environment Study
FM No. 430132-1-22-01

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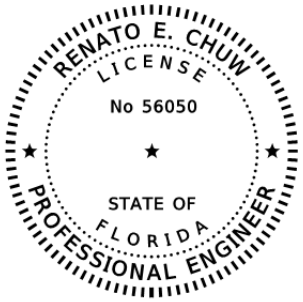
Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Inwood Consulting Engineers, Inc., a corporation authorized to operate as an engineering business, FEID No. 59-3216593, by the State of Florida, Department of Professional Regulation, and Board of Professional Engineers. I have reviewed or approved the evaluation, findings, opinions and conclusions as reported in this Final Location Hydraulic Report.

The Final Location Hydraulic Report includes a summary of data collection efforts and design analysis for the US 301 PD&E Study from CR 470 to SR 44. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of civil engineering as applied through design standards and criteria set forth by the federal, state, and local regulatory agencies as well as professional judgment and experience.



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Executive Summary

The Florida Department of Transportation (FDOT), is conducting a Project Development and Environment (PD&E) study for an approximately 8.0 mile portion of US 301 between CR 470 East and SR 44 in Sumter County. The proposed improvements consist of widening US 301 from two (2) to four (4) lanes. The project is located within the Withlacoochee River South watershed (Walled Sink, Outlet River, Shady Brook and Little Jones Creek sub-basins).

The purpose of this Location Hydraulic Report is to address base floodplain encroachments resulting from the roadway improvements evaluated in the PD&E Study. In accordance with Executive Order 11988 "Floodplain Management", USDOT Order 5650.2, "Floodplain Management Protection", and Federal-Aid Policy Guide 23 CFR 650A, Floodplains must be protected. The intent of these regulations is to avoid or minimize highway encroachments within the 100-year (base) floodplains and to avoid supporting land use development incompatible with floodplain values.

Floodplain encroachments areas resulting from the proposed US 301 roadway widening were quantified. It is determined that impacts will occur to the floodplain associated with the proposed widening throughout the project limits and the widening of Bridge #180073, and cross drains CD-05, CD-06, CD-12, CD-13, and CD-14.

The majority of the project encroachments occur within Zone A of the 100-year floodplain. However, the 100-year flood zone west of US 301 at the bridge over Shady Brook is designated as Zone AE with a base flood elevation of 44.30 feet NAVD. There are no federally regulated floodways within the project limits. It was concluded that the project will impact approximately 10.55 ac-ft of floodplain based on the proposed roadway alignment. However, due to the isolated nature of the majority of the flood zones, it was determined that the floodplain encroachment is classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Please refer to **Section 3.4** for additional information.

In conclusion, the following floodplain statement is a slightly modified version of statement Number 4 in the FDOT PD&E Manual, tailored for this project:

"The proposed cross drains and Floodplain compensation areas will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant."

1.0 Project Description

FDOT is conducting a Project Development and Environment (PD&E) study for an approximately 8.0 mile portion of US 301 between CR 470 East and SR 44 in Sumter County. Within these limits, US 301 (SR 35) travels through the cities of Coleman and Wildwood. While mostly a north-south route, US 301 travels in an east-west direction through the City of Coleman where it has the local road name Warm Springs Avenue. The Florida's Turnpike (SR 91) crosses US 301 with an interchange to the south of the northern project limit, and I-75 runs parallel to the study corridor on the west of US 301 through Sumter County.

The PD&E study will analyze design alternatives that widen US 301; improve the US 301 interchange at Florida's Turnpike; and consider a new corridor for US 301 south of the City of Coleman. The improvements will seek to provide additional capacity for future traffic growth. US 301 is projected to carry more than 14,000 vehicles per day by 2022 and increase to more than 24,000 per day by 2042. Based on existing 2014 conditions analysis, US 301 carried up to 9,600 vehicles per day on a 2-lane segment south of the Turnpike operating with a Level of Service of D.

Within the project limits, US 301 begins as a two-lane undivided roadway at CR 470 East with turn lanes at some intersections; makes a sharp 90° turn through the City of Coleman (Warm Springs Avenue/Commercial Street) and then curves to the north at CR 468. It then continues north as an undivided roadway until it reaches the Florida's Turnpike interchange where a median is added. North of the interchange the roadway is a four-lane divided, rural typical section facility. It has a short urban curb and gutter section approaching SR 44.

The purpose of this project is to increase the capacity of US 301, to respond to future travel demand from the intersection of CR 470 East, north through the City of Coleman, to SR 44 in the City of Wildwood. The project will also improve safety and provide multi-modal facilities for pedestrian and bicyclists, and evaluate improvements to the US 301 interchange with the Florida's Turnpike.

This study will evaluate all viable alternatives to widen US 301 on the existing project corridor as well as a potential realignment for US 301 from near CR 525 to CR 468 to minimize potential environmental impacts to the City of Coleman. **Figure 1-1** shows the study corridor and potential realignment (truck route) area.

Figure 1-1 | Project Location Map

1.1 Roadway Study Segments

The study corridor has been broken down into six general roadway segments based on changes in roadway characteristics and adjacent land uses. These segments, shown on **Figure 1-2**, will be referred to as follows:

Segment 1 – South of CR 470 East to Shady Brook Drive

Segment 1 extends north from south of CR 470 E (MP 14.53) to Shady Brook Drive (MP 14.83), and is approximately 0.3 miles in length. It includes open drainage to roadside swales and consists of a three-lane typical section including one travel lane in each direction and a center left turn lane. This segment of the corridor is classified as a Rural Principal Arterial Other and has an existing speed limit of 50 mph. Shady Brook Resort and Golf Club is a significant use adjacent to this segment.

Segment 2 – Shady Brook Drive to CR 525 East

Segment 2 extends north from Shady Brook Drive (MP 14.83) to CR 525 E (MP 16.991), including the Shady Brook Bridge, and is approximately 2.2 miles in length. The segment includes open drainage to roadside swales and is a two-lane rural typical section. It has a posted speed of 55 mph and is classified as a Rural Principal Arterial Other. Shady Brook Park is a significant land use located along the segment.

Segment 3 – CR 525 East to Stokes Street

Segment 3 extends from CR 525 East (MP 16.991) to Stokes Street (MP 18.706) and is classified as a Rural Principal Arterial Other with posted speeds ranging between 35 and 45 mph. It is approximately 1.7 miles in length and is a two lane rural roadway. It follows Warm Springs Avenue as it runs east-west through the City of Coleman. There are numerous homes and businesses with relatively small setbacks from the roadway along this segment. Most of the segment has a sidewalk on one side of the roadway.

Segment 4 – Stokes Street to Florida's Turnpike

Segment 4 extends east from Stokes Street (MP 18.706) to Florida's Turnpike (MP 21.663) and is approximately 3.0 miles in length. It consists of two 12-foot travel lanes (one in each direction) and a five foot paved shoulder on either side of the roadway. This segment also includes open drainage to roadside swales and is classified as a Rural Principal Arterial Other with posted speeds of 55 mph between Stokes Street and the northbound entrance to Florida's Turnpike (SR 91), where it reduces to 45 mph. The existing and future land use context of the corridor is mostly auto oriented development. The segment is influenced by the CR 468 curve and the development that is occurring near the CR 468 intersection at the Village of Fenney.

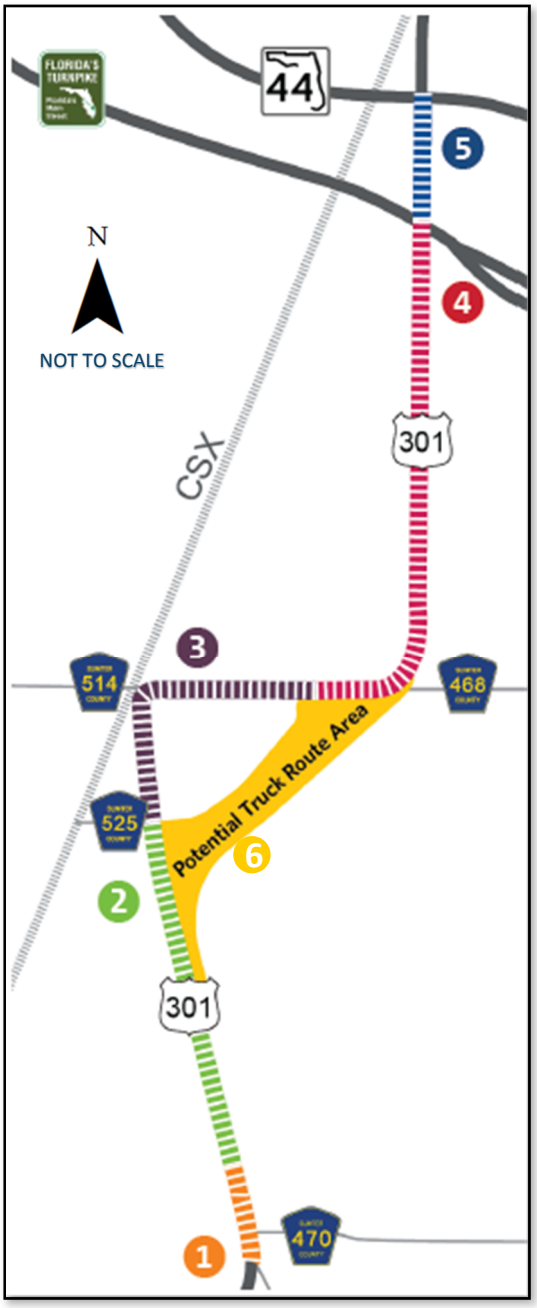
Segment 5 – North of Florida's Turnpike to SR 44

Segment 5 extends north from Florida's Turnpike (MP 21.663) to just south of SR 44 (MP 22.395) and is approximately 0.7 miles in length. It is classified as an Urban Principal Arterial with posted speeds ranging between 40 and 45 mph. In contrast to Segments 1 through 4, Segment 5 is already predominantly a four-lane divided roadway. The northern portion of the segment (north of Spring Lake Road) has a closed drainage system with an outside curb and gutter. South of Spring Lake Road the segment includes open drainage to roadside swales. This segment of the roadway is within the City of Wildwood and approximately half of the segment has adjacent urban development.

Segment 6 – Truck Route/ US 301 Realignment

The truck route will require a new roadway alignment (approximately 1.5 miles) and construction over current non-roadway property linking CR 525 East to CR 468. While the area for the route is currently largely undeveloped, both ends of this segment have impending development that is currently in the permitting process. The Villages Industrial Park (formerly Wade Industrial Park) and Monarch Ranch are planned for the CR 525 East area while the CR 468 area will be home to the Village of Fenney.

Figure 1-2 | US 301 Existing Roadway Segments



1.2 Recommended Typical Sections

As a result of the typical section evaluation, three (3) typical sections as shown in **Figures 1-3, 1-4** and **1-5** were carried forward to the segment analysis.

A 45 mph urban typical section with four travel lanes separated by a 28-foot raised median with five foot sidewalks and seven foot buffered shoulders on each side is under consideration for Segment 3 of this project. **Figure 1-3** illustrates the proposed urban typical section.

A 45 mph urban typical section with four travel lanes separated by a 28-foot raised median seven foot buffered shoulders and six foot sidewalks on each side is under consideration for Segment 5 of this project. **Figure 1-4** illustrates the proposed urban typical section.

A 55 mph suburban typical section with four travel lanes separated by a 22-foot raised median with four foot paved inside shoulders, seven foot buffered shoulder, and five foot sidewalks on each side is under consideration for Segments 1, 2, 4, and 6 of this project. **Figure 1-5** illustrates the proposed suburban typical section.

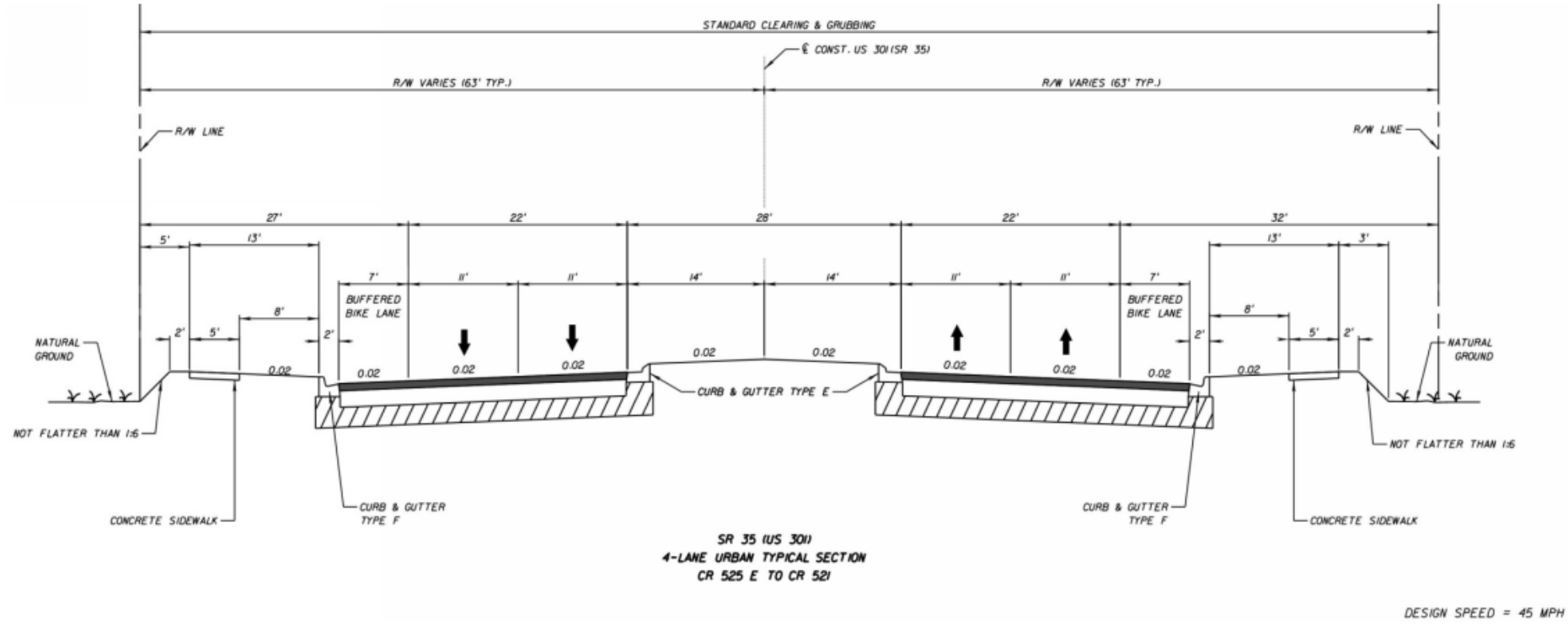


Figure 1-3 | Recommended Urban Typical Section – Coleman

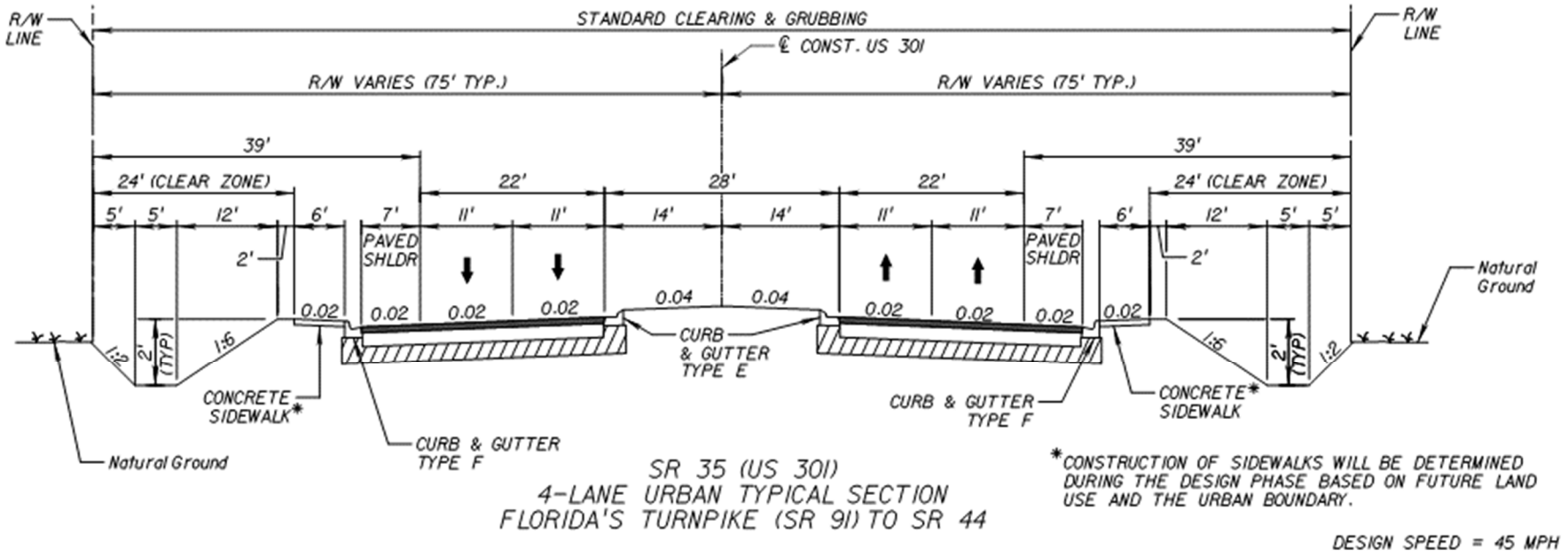
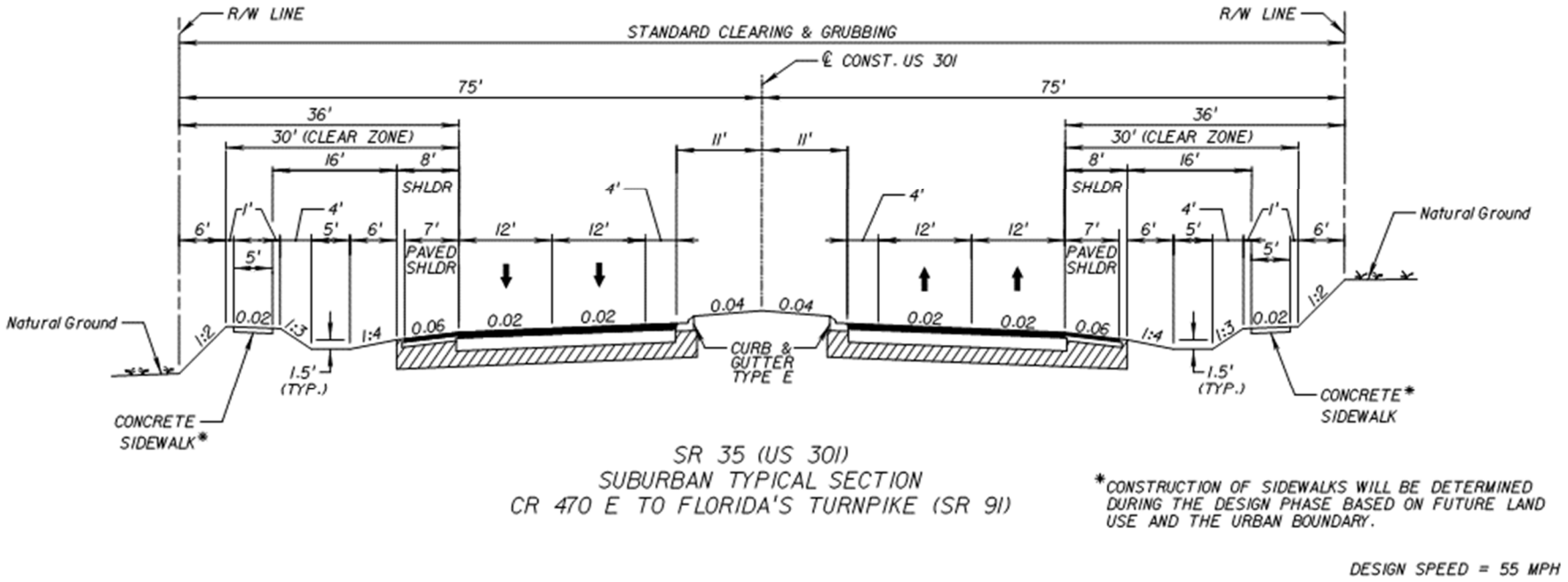


Figure 1-4 | Recommended Urban Typical Section – Segment 5



SR 35 (US 301)
SUBURBAN TYPICAL SECTION
CR 470 E TO FLORIDA'S TURNPIKE (SR 91)

*CONSTRUCTION OF SIDEWALKS WILL BE DETERMINED DURING THE DESIGN PHASE BASED ON FUTURE LAND USE AND THE URBAN BOUNDARY.

DESIGN SPEED = 55 MPH

Figure 1-5 | Recommended Suburban Typical Section

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2.0 Data Collection

The following date sources were used to prepare this report:

- FDOT Drainage Design Guidelines, January 2017
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel Nos. 12119C0143D, 1211C0139D, 12119C0137D, 12119C0141D, 12119C0133D, 12119C0131D for Sumter County, Effective Date 9/27/2013
- United States Geological Survey (USGS) Quadrangle Maps
- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soils Survey of Sumter County, Florida, 1990
- FDOT Straight Line Diagrams (SLD's) of road inventory for US 301 (SR 35)
- Field Reconnaissance (February 2016)
- Flooding Evaluation Technical Memorandum, ICON Consultant Group, Inc. (December 21, 2016)

3.0 Existing Drainage Conditions

3.1 Topography & Hydrologic Features

The topography of the project area is relatively flat, however roadway elevations on US 301 range between 72 feet and 52 feet NAVD 88. Please refer to the **USGS Quadrangle Map**, **Figure 3** in **Appendix A**. The project area traverses five (5) Waterbody IDs (WBIDs): 1344 – Little Jones Creek, 1351 – Lake Panasoffkee Drain, 1351C – Lake Panasoffkee Drain, 1356 – Shady Brook, and 1359D – Walled Sink Ditch. Please refer to the **WBID Map**, **Figure 7** in **Appendix A**. There are fourteen (14) existing cross drains and one (1) bridge within the project limits allowing for conveyance of offsite and onsite runoff to flow beneath US 301 toward Lake Panasoffkee and the Withlacoochee River. The size and geometry of all cross drains and bridges have been verified from the FDOT SLD's, 1-foot LiDAR contours, existing plans, as well as during field reconnaissance. Please refer to **Table 1** for a **Summary of Existing Cross Drains and Bridges**. During final design, the existing cross drains will need to be evaluated for extensions or replacements to accommodate the roadway widening.

Table 1 | Summary Existing Cross Drains and Bridges

Structure No.	FDOT Milepost	Station	Description	Remarks
CD-01	14.601	-	Double 7' x 6' CBC	
CD-02	15.282	132+36	Single 24" RCP	
Bridge-1	15.621 - 15.643	150+18 – 151+12	116.2' Bridge	Shady Brook
CD-03	16.355	190+21	Single 24" RCP	
CD-04	16.577	201+95	Double 24" RCP	
CD-05	17.203	10026+41	Single 15" RCP	
CD-06	17.375	10035+49	Single 24" RCP	
CD-07	18.481	10092+84	Single 42" RCP	
CD-08	18.990	10118+73	Single 30" RCP	
CD-09	19.334	1100+06	Single 2' x 2' CBC	
CD-10	19.533	1110+74	Single 30" RCP	
CD-11	20.457	540+60	Single 36" RCP	
CD-12	20.907	564+49	Single 36" RCP	
CD-13	21.529	-	Double 8' x 5' CBC	
CD-14	21.971	-	Single 9' x 3' CBC	

3.2 Soils Data and Geotechnical Investigations

The soil survey of Sumter County, Florida (dated 1990) published by the USDA NRCS has been reviewed within the project vicinity. USDA Soil Survey Geographic database (SSURGO) data was also obtained from Southwest Florida Water Management District (SWFWMD) to create a soils map for the project limits using GIS ArcMap. SSURGO data was compared to the soil survey by USDA NRCS and found no deviation. The soil survey map for the project vicinity is illustrated in **Figures 4A** and **4B** of **Appendix A**.

The soils encountered along the project limits are mostly Hydrologic Soil Group (HSG) A, A/D, B/D, C/D and D. Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission. Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission. If a soil is assigned to a dual HSG, the first letter is for drained areas and the second is for un-drained areas. Only the soils that in their natural condition are in group D are assigned to dual classes. According to the Soil Survey, there are 41 different soil types located along the project limits. **Table 2 – USDA NRCS Soil Survey Information: Sumter County** summarizes and lists the soil types and relevant information. The ground water depth varies from +2' to greater than 6' along the project.

Table 2 | USDA NRCS Soil Survey Information: Sumter County

Soil No.	USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
4	Candler Sand, 0 to 5 Percent Slopes	>6.0	---	A	0-8	SP, SP-SM	A-3
					8-50	SP, SP-SM	A-3
					50-80	SP-SM	A-3, A-2-4
6	Kendrick Fine Sand, 0 to 5 Percent Slopes	>6.0	---	A	0-33	SP-SM, SM	A-3, A-2-4
					33-68	SC, SM-SC	A-2-6, A-2-4
					68-80	SC	A-2-6, A-6
8	Lake Fine Sand, 0 to 5 Percent Slopes	>6.0	---	A	0-80	SP-SM	A-3, A-2-4
9	Paisley Fine Sand, Bouldery Subsurface	0.5-1.5	Jun-Nov	B/D	0-16	SP-SM, SM	A-2-4, A-3
					16-25	SC	A-6, A-7
					25-80	CH, CL	A-7
10	Sparr Fine Sand, 0 to 5 Percent Slopes	1.5-3.5	Jul-Oct	A/D	0-9	SP-SM, SM	A-3, A-2-4
					9-45	SP-SM, SM	A-3, A-2-4
					45-51	SM-SC, SC, SM	A-2-4
					51-80	SC, SM-SC	A-2, A-4, A-6, A-7
11	Millhopper Sand, 0 to 5 Percent Slopes	3.5-6.0	Aug-Oct	A	0-50	SP-SM, SM	A-3, A-2-4
					50-80	SM, SM-SC, SC	A-2-4, A-2-6, A-4, A-6
13	Tavares Fine Sand, 0 to 5 Percent Slopes	3.5-6.0	Jun-Dec	A	0-8	SP, SP-SM	A-3
					8-80	SP, SP-SM	A-3
15	Adamsville Fine Sand, Bouldery Subsurface	2.0-3.5	Jun-Nov	A	0-5	SP-SM	A-3, A-2-4
					5-80	SP-SM, SP	A-3, A-2-4

Soil No.	USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
17	Sumterville-Mabel-Tavares Association, Bouldery Subsurface, 0 to 5 Percent Slopes	1.5-3.0	Jul-Oct	C/D	0-7	SP-SM, SM	A-3, A-2-4
					7-25	SP-SM, SM	A-3, A-2-4
					25-80	CL, CH	A-2-6, A-4, A-6
21	EauGallie Fine Sand, Bouldery Subsurface	0.5-1.5	Jun-Oct	A/D	0-8	SP	A-3
					8-25	SP	A-3
					25-36	SP-SM, SM	A-3, A-2-4
					36-57	SP, SP-SM	A-3, A-2-4
					57-80	SM, SM-SC, SC	A-2-4, A-2-6
22	Smyrna-Smyrna, Wet, Fine Sand, 0 to 2 Percent Slopes	0.5-1.5	Jul-Oct	A/D	0-15	SP, SP-SM	A-3, A-2-4
					15-28	SM, SP-SM	A-3, A-2-4
					28-80	SP, SP-SM	A-3
23	Ona Fine Sand	0.5-1.5	Jun-Nov	B/D	0-9	SP-SM, SP	A-3
					9-20	SP-SM, SM	A-3, A-2-4
					20-80	SP-SM, SP	A-3
24	Basinger Fine Sand	0-1.0	Jun-Feb	A/D	0-8	SP	A-3
					8-27	SP, SP-SM	A-3, A-2-4
					27-45	SP, SP-SM	A-3, A-2-4
					45-80	SP, SP-SM	A-3, A-2-4
25	Kanapaha Sand, Bouldery Subsurface	0.5-1.5	Jul-Sep	A/D	0-3	SP-SM	A-3, A-2-4
					3-55	SP-SM	A-3, A-2-4
					55-80	SC, SM-SC	A-2-4, A-4, A-6
26	Wabasso Fine Sand, Bouldery Subsurface	0-1.0	Jun-Oct	B/D	0-4	SP-SM	A-3, A-2-4
					4-15	SP-SM	A-3, A-2-4
					15-21	SP-SM, SM	A-2-4, A-3
					21-60	SC, CL, CH	A-7, A-6, A-2-6, A-2-7
					60-80	SM-SC, SC, SM	A-6, A-4, A-2-4, A-2-6
27	Sumterville Fine Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	1.5-3.0	Jul-Oct	C/D	0-9	SP-SM, SM	A-3, A-2-4
					9-29	SP-SM, SM	A-3, A-2-4
					29-80	CL, CH	A-7
29	Nittaw Muck, Frequently Flooded	0-1.0	Jun-Nov	C/D	0-5	PT	---
					5-12	SP-SM, SM	A-3, A-2-4
					12-65	CH, CL	A-7
					65-80	SP, SP-SM, SM, SM-SC	A-3, A-2-4
30	Placid Fine Sand, Depressional	0-1.0	Jun-Mar	A/D	0-16	SP, SP-SM, SM	A-3, A-2-4
					16-80	SP, SP-SM, SM	A-3, A-2-4
32	Pompano Fine Sand	0-1.0	Jun-Nov	A/D	0-80	SP, SP-SM	A-3, A-2-4

Soil No.	USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
33	Sparr Fine Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	1.5-3.5	Jul-Oct	A/D	0-8	SP-SM	A-3, A-2-4
					8-46	SP-SM	A-3, A-2-4
					46-58	SM, SC, SM-SC	A-2-4
					58-80	SC, SM-SC	A-2-4, A-2-6, A-2, A-6
34	Tarrytown Sandy Clay Loam, Bouldery Subsurface	1.0-2.0	Jul-Sep	C/D	0-7	SM	A-2-4
					7-14	SC, CH, CL	A-4, A-6, A-7
					14-50	SC, CL, SM-SC, CL-ML	A-4
					50-80	SP-SM, SP	A-3, A-2-4
36	Floridana Mucky Fine Sand, Depressional	0-1.0	Jun-Feb	C/D	0-12	SP-SM, SM	A-3, A-2-4
					12-25	SP, SP-SM	A-3
					25-80	SM-SC, SC	A-2-4, A-2-6
37	Astatula Fine Sand, 0 to 8 Percent Slopes	>6.0	---	A	0-5	SP, SP-SM	A-3
					5-80	SP, SP-SM	A-3
39	Mabel Fine Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	1.5-3.0	Jul-Sep	D	0-16	SP-SM, SP, SM	A-2-4, A-3
					16-24	SC, CL, CH	A-6, A-7, A-2
					24-30	CH, MH	A-7
					30-80	SC, CS, CL	A-6, A-7
40	Millhopper Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	3.5-6.0	Aug-Oct	A	0-7	SP-SM	A-3, A-2-4
					7-45	SP-SM	A-3, A-2-4
					45-80	SM, SM-SC, SC	A-2-4, A-4, A-2-6, A-6
42	Adamsville Fine Sand	2.0-3.5	Jun-Nov	A	0-8	SP-SM	A-3, A-2-4
					8-80	SP-SM, SP	A-3, A-2-4
43	Basinger Fine Sand, Depressional, 0 to 1 Percent Slopes	0-1.0	Jun-Feb	A/D	0-6	SP	A-3
					6-15	SP, SP-SM	A-3, A-2-4
					15-30	SP, SP-SM	A-3, A-2-4
					30-80	SP, SP-SM	A-3, A-2-4
44	Oldsmar Fine Sand, Bouldery Subsurface	0.5-1.5	Jun-Oct	A/D	0-31	SP, SP-SM	A-3
					31-48	SP-SM, SM	A-2-4, A-3
					48-80	SM-SC, SC	A-2, A-4, A-6, A-7
45	Electra Fine Sand, Bouldery Subsurface	2.0-3.5	Jul-Oct	A	0-3	SP, SP-SM	A-3
					3-35	SP, SP-SM	A-3
					35-40	SP-SM, SM	A-3, A-2-4
					40-46	SP, SP-SM	A-3
					46-80	SC, SM-SC	A-2, A-4, A-6
46	Ft. Green Fine Sand, Bouldery Subsurface	0.5-1.5	Jun-Jan	C/D	0-28	SP-SM, SM	A-3, A-2-4
					28-38	SC, SM-SC, SM	A-2-6, A-6, A-2-4, A-4
					38-58	SC	A-2-6, A-6, A-4, A-7-6
					58-80	SC, SM-SC, SM	A-2-6, A-6, A-2-4, A-4
47	Okeelanta Muck, Frequently Flooded	0-1.0	Jan-Dec	A/D	0-19	PT	A-8
					19-80	SP, SP-SM, SM	A-3, A-2-4

Soil No.	USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth* (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
49	Terra Ceia Muck, 0 to 1 Percent Slopes, Frequently Flooded	0-0.5	Jan-Dec	A/D	0-80	PT	A-8
50	Immokalee Sand	0.5-1.5	Jun-Nov	B/D	0-5	SP, SP-SM	A-3
					5-34	SP, SP-SM	A-3
					34-46	SP-SM, SM	A-3, A-2-4
					46-80	SP, SP-SM	A-3
51	Pits-Dumps Complex	---	---	---	---	---	---
53	Tavares Fine Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	3.5-6.0	Jun-Dec	A	0-7	SP, SP-SM	A-3
					7-80	SP, SP-SM	A-3
54	Monteocha Fine Sand, Depressional	+2-0	Jun-Feb	D	0-11	SP-SM, SM	A-3, A-2-4
					11-65	SP, SP-SM, SM	A-3, A-2-4
					65-80	SM, SM-SC, SC	A-2-4, A-2-6
55	Pomello Fine Sand, 0 to 5 Percent Slopes	2.0-3.5	Jul-Nov	A	0-40	SP, SP-SM	A-3
					40-56	SP-SM, SM	A-3, A-2-4
					56-80	SP, SP-SM	A-3
56	Wabasso Fine Sand, Depressional	+1-1.0	Jun-Feb	C/D	0-17	SP-SM, SM	A-3, A-2-4
					17-33	SM	A-2-4
					33-60	SM, SM-SC, SC	A-2-4, A-2-6, A-6, A-4
					60-80	SM, SC, SM-SC	A-2-4, A-2-6, A-6, A-4
58	Paisley Fine Sand, Depressional	0-1.0	Jun-Feb	C/D	0-13	SP-SM	A-2-4, A-3
					13-80	CH, CL	A-7
62	Urban Land	---	---	---	---	---	---
65	Candler Sand, Bouldery Subsurface, 0 to 5 Percent Slopes	>6.0	---	A	0-3	SP, SP-SM	A-3
					3-65	SP, SP-SM	A-3
					65-80	SP-SM	A-3, A-2-4

Seasonal High Ground Water Table: Depth is referenced below existing grade, except where indicated as "+".

3.3 Environmental Characteristics

3.3.1 Land Use Data

The project corridor is a mixture of residential, commercial, agricultural, pasture, upland forest and wetlands. Please see **Figure 5A & 5B** for the **Land Use Map** in **Appendix A**. The widening of US 301 from north of CR 470 East to SR 44 does not alter the existing or future land uses in the area.

3.3.2 Cultural Features

Cultural features preserve and enhance the cultural nature of a community and include parks, schools, churches and other religious institutions. Also included are historic sites, archaeologically significant sites and neighborhood gathering places. Community services include facilities that provide necessary services such as fire stations, police stations, public and private schools, hospitals, cemeteries, public buildings, and civic facilities. As a result of the cultural resource assessment survey of the proposed pond locations, five newly recorded archeological sites were recorded within five of the pond sites and the boundaries of one previously recorded site were expanded within one pond site. Please refer to **Appendix F - Cultural Resource Assessment Survey Addendum** within the **Pond Siting Report** for further information.

3.3.3 Natural and Biological Features

The proposed project has potential to involve several State and/or Federally listed protected wildlife species. These species and their anticipated involvement are identified in the Wildlife and Habitat Report located in **Appendix G – Natural Resource Evaluation Report** within the **Pond Siting Report**.

The project corridor was evaluated for the presence of potentially-occurring species. It was determined that four protected species could potentially occur within the project area, the gopher tortoise, the Florida burrowing owl, the wood stork and the Southeastern American Kestrel. The likelihood of each species occurring within the project corridor was evaluated based on historic ranges, literature review, aerial photography interpretation to identify suitable habitat, and field investigations.

The identification of wetlands has been investigated and is included within the **Natural Resource Evaluation Report** located in **Appendix G** within the **Pond Siting Report**. It is likely that this project will impact wetlands regulated by the State and Federal Governments. Pond alternative recommendations will be based on avoidance of wetland impacts whenever possible.

3.4 Floodplains/Floodways

According to the Federal Emergency Management Agency (FEMA) the relevant Flood Insurance Rate Map (FIRM) panel numbers are 12119C0143D, 1211C0139D, 12119C0137D, 12119C0141D, 12119C0133D, 12119C0131D for Sumter County, dated September 27, 2013. According to the FEMA FIRMs, much of the project is within Zone X of the 100-year floodplain, which are determined to be outside the 0.2% annual chance of flooding. However, portions of the project will impact small pockets of the 100-year floodplain which lie within Zone A. These areas are associated with small depressional areas or wetlands and have a 1% probability of flooding every year, and where predicted flood water elevations have not been established. The 100-year flood zone west of US 301 at the bridge over Shady Brook is designated as Zone AE with a base flood elevation of 44.30 feet NAVD. There are no federally regulated floodways within the project limits. Please refer to **Figure 6** in **Appendix A** for the **FEMA Floodplains Map** and **Figures 9A** through **9F** in **Appendix A** for the **FEMA FIRM Panels**.

General comments relating to floodplains include the fact that any development within the 100-year floodplain has the potential for placing citizens and property at risk of flooding and producing changes in floodplain elevations and plan view extent. Development (such as roadways, housing developments, strip malls and other

commercial facilities) within floodplains increases the potential for flooding by limiting flood storage capacity and exposing people and property to flood hazards. Development also reduces vegetated buffers that protect water quality and destroys important habitats for fish and wildlife. The area surrounding the proposed roadway widening project has and will continue to experience growth.

Any floodplain impacts will be mitigated for in offsite floodplain compensation sites, or cut ditch sections on a cup for cup basis. From the available data, approximate Floodplain Impact Areas (FIA) have been determined based on areas in which the Zone A and Zone AE 100-year floodplains lie within the proposed right-of-way. Within the project limits, seven (7) FIA have been identified. **Figure 3-1** illustrates the locations of these Floodplain Impact Areas.

To determine the base flood elevation for areas within Zone A, the floodplain boundary was compared to the 1-foot LiDAR contours and was determined to be the elevation at which the contour most closely resembled the Zone A floodplain boundary. Floodplain impacts within both flood zones were quantified by cutting existing ground cross sections at critical junctures along each FIA. Existing ground cross sections were developed from the 1-ft LiDAR data. Then, the floodplain elevation was drawn upon the cross sections. Using the average end-area method, volumetric impacts were quantified conservatively as the average area between the 100-year flood elevation and the existing ground for two consecutive cross sections and then multiplied by the distance between the two cross sections. The analysis data indicate that approximately 10.55 ac-ft of 100-year floodplain volume is impacted within the project limits. The project has the potential to impact floodplains and their functions in the area.

For the purpose of this study, a cup for cup approach was taken to provide FDOT with right-of-way estimates for funding projections. Compensation volumes were calculated to be the available volume between the Seasonal High Water Table (SHWT) of the proposed compensation site and the 100-year flood elevation of the Floodplain Impact Area. Floodplain Compensation Areas (FPCA) are shown in **Figure 3-1**. Refer to the **Pond Siting Report** prepared for the study for further information.

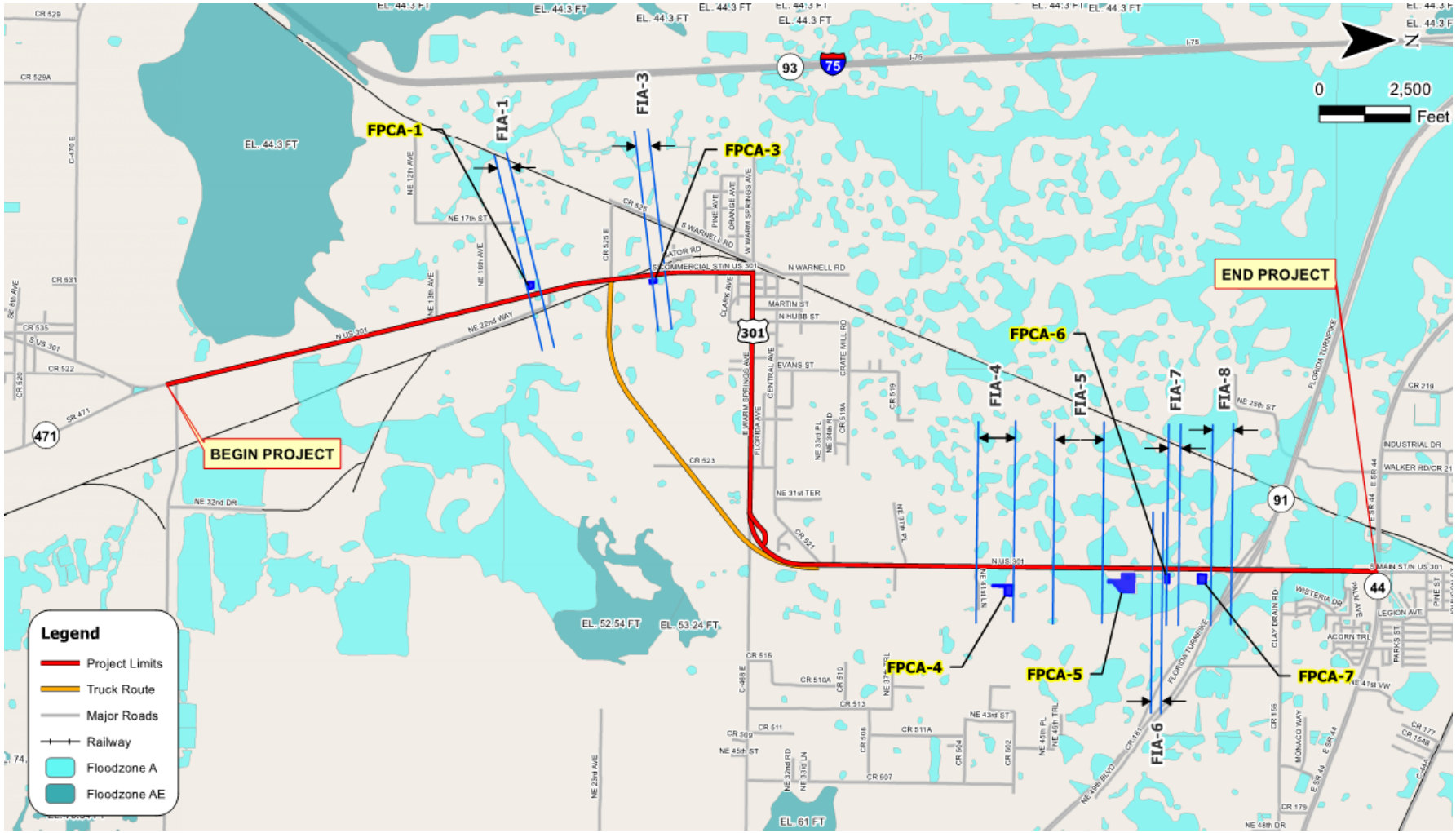

Figure 3-1 | Floodplain Impact Areas (FIAs)

Table 3 | Summary of Floodplain Impact Areas (FIA)

FIA	From Station	To Station	Length of Impact (ft)	100-yr Flood Elevation	Impact Volume (ac-ft)
FIA – 1	199+64.60	203+05.73	341	54.50	0.30
FIA – 3	10025+15.37	10028+93.54	378	56.00	0.37
FIA – 4	531+41.49	541+60.70	1,019	58.00	2.69
FIA – 5	552+44.83	565+97.09	1,352	57.00	4.52
FIA – 6	579+66.23	582+37.79	272	56.00	0.29
FIA – 7	583+60.39	586+92.51	332	56.00	0.58
FIA – 8	595+75.57	601+29.45	554	56.00	1.79
				Total	**10.55**

Notes: Impact volumes obtained through average end-area volumetric calculations utilizing the 1-ft LiDAR contours to develop existing ground cross sections.

3.4.1 Flooding History and Maintenance Concern

The City of Coleman was contacted to discuss any flooding history and maintenance concerns. During a site visit, Inwood staff met with the Mayor of Coleman (Milton Hill) and the President of the Coleman City Council (Richard Huff) to discuss flooding issues on Florida Avenue between Commercial Street and Mulberry Street, north of US 301. Storm water flows from a highpoint in the topography to the east, along Florida Avenue and collects in both the roadway and the open portion of the adjacent parcel, covering this entire area. Mr. Hill and Mr. Huff also reported flood waters rising high enough to enter some surrounding buildings and seeping into a nearby septic tank. Mr. Hill and Mr. Huff said flooding has reached US 301 during times of heavy rain, overtopping the road and flowing into a storm sewer system installed on the south side of the road. Mr. Hill and Mr. Huff then identified this storm sewer infrastructure installed by FDOT at the intersection of Commercial Street and Warm Springs Avenue (US 301) which consisted of one DBI and two grate inlets. This system outfalls into a ditch along the east side of the nearby CSX railway which flows south. These locations are shown in **Figure 3-2**.

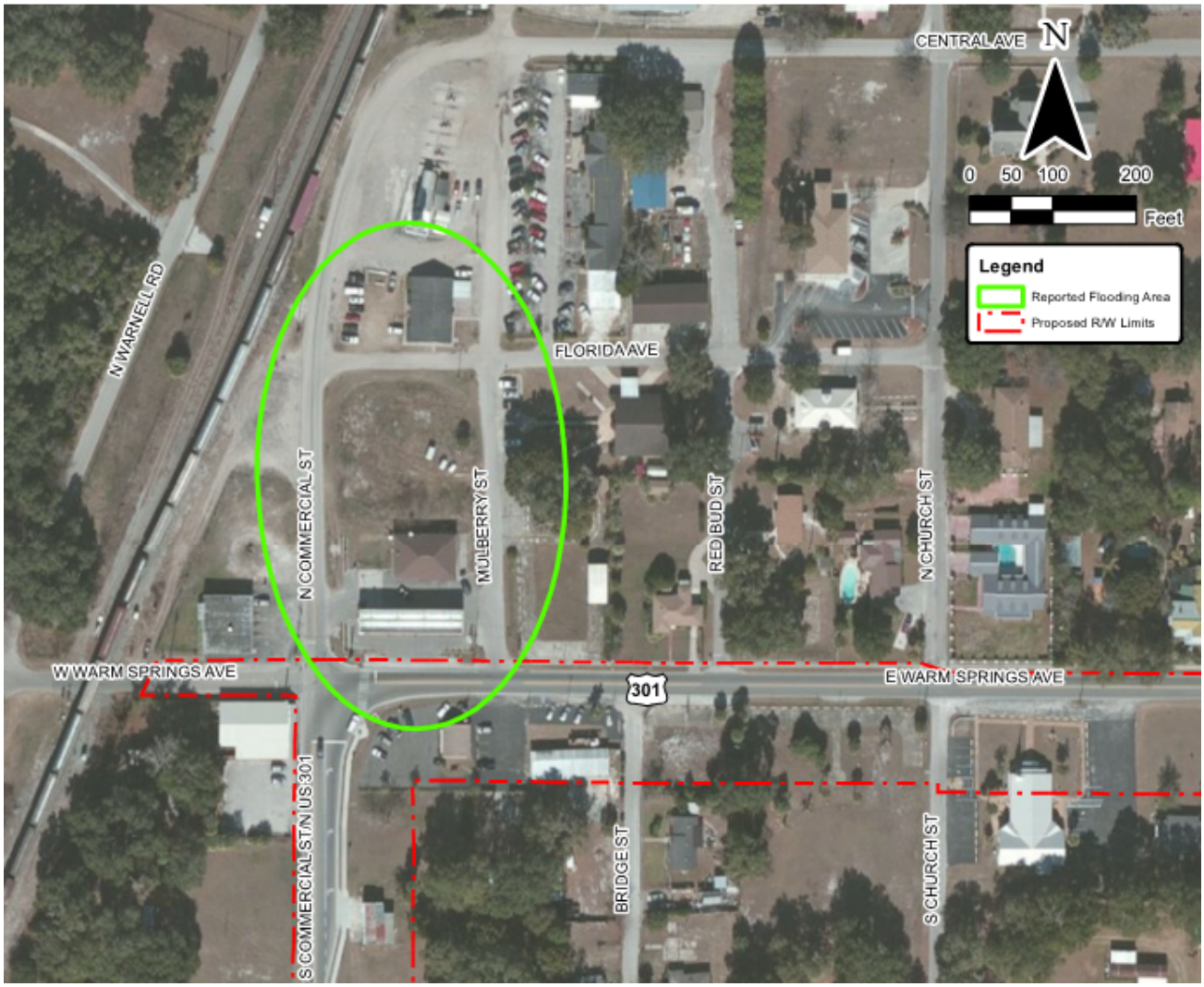

Figure 3-2 | Reported Flooding Location Map

A preliminary Flooding Evaluation performed by ICON Consulting Group Inc. (December 2016) for the City of Coleman identified several options to alleviate the flooding in this location which include:

Option 1 - This option proposes to redirect runoff into an existing City owned pond. The results of the analysis show that the use of this pond for added regional storage does not relieve existing flooding problems. In addition, the added tributary drainage basin area will cause the pond to discharge excess flows over its banks more often for both higher frequency and duration storm events.

> ***Conclusion****: Option 1 does not provide a partial solution to the flooding on Florida Avenue. Furthermore, unless an adequate outfall system for this pond can be constructed to a reasonable discharge point downstream, use of the City's pond would only create another drainage issue whenever the redirected stormwater runoff overtops the pond bank.*

Option 2 - Option 2 replaces the existing buried culvert under Warm Springs Avenue just east of the railroad with a squashed 19" x 30" ERCP culvert. This added positive drainage does not alleviate existing flooding on Florida Avenue. The one benefit it does have is that it alleviates the current flooding that occurs north of the D&C Mart, west of Commercial Street and reduces the overtopping of Warm Springs Avenue east of the railroad.

> ***Conclusion****: Option 2 does not provide a partial solution to the flooding along Florida Avenue. However, restoring the function of this cross drain would have a significant benefit to the flooding north of the D&C Mart.*

Option 3 - Option 3 increases the storage within the area by creating a pond and thereby reduces flooding on Florida Avenue, Mulberry Street and Commercial Street. The overall performance and recovery of the storage within the pond can be improved with the addition of a bleed down system designed to discharge either to Warm Springs Avenue or directly to the CSX RR right-of-way.

> ***Conclusion****: Creating a pond to provide added storage proved to be the most beneficial for the region. However, the level of service would be about a 5-year event. The addition of a bleed down system would also be a benefit for the recovery of the storage basin. However, the property is privately owned and would have to be acquired to achieve the benefits of this option.*

Option 4 - Option 4 adds a proposed pond at the southeast corner of Warm Springs Avenue and Commercial Street and provides cross-drainage from Florida Avenue south to the proposed pond. This option had little effect on the existing flooding of Florida Avenue.

> ***Conclusion****: The only benefit for Option 4 is that it would enable the area of flooding to have a bleed down mechanism tied to the US 301 drainage system. However, this option does not help to reduce the flood stages within flood prone area. In addition, this property is privately owned and would have to be acquired.*

Options proposing to discharge directly to the CSX railroad right-of-way will require coordination with CSX. For additional information please refer to **Appendix E – Flooding Evaluation Technical Memorandum** by ICON Consultant Group, Inc.

4.0 Proposed Drainage Conditions

The stormwater runoff from the project limits will be collected and conveyed in roadside ditches to the proposed offsite wet detention and dry retention ponds. The ponds will discharge at or near the same cross drains that carry the roadway runoff in the existing condition. The proposed ponds have been sized to achieve the required water quality treatment and water quantity attenuation and serve as a budget tool for right-of-way estimation for the project to the Department. Please refer to the **Pond Siting Report** prepared for this study.

4.1 Proposed Cross Drains

Proposed cross drains along the US 301 realignment are required to allow the offsite flow to mimic the pre-development conditions. There are six (6) proposed cross drains which will allow storm water runoff to flow beneath the US 301 realignment along its historical path. **Table 4** below provides a **Summary of Proposed Cross Drains**.

Table 4 | Summary of Proposed Cross Drains

Structure No.	Station	Description
CD-15	317+30	Double 42” RCP
CD-16	325+15	Double 24” RCP
CD-17	350+05	Double 36” RCP
CD-18	359+95	Single 24” RCP
CD-19	375+20	Single 30” RCP
CD-20	381+50	Single 24” RCP

The hydrologic analyses for the proposed cross drains were based on the Rational Method for a 50-year, 100-year, and 500-year storm frequencies. Recommended pipe sizes are based on certain assumptions for the hydraulic analyses such as roadway crest elevation, crest lengths and tailwater conditions. These assumptions were derived from the best available information at the time, such as 1-ft LiDAR contours; for example, the roadway crest elevation and lengths assumed that the proposed roadway profile would match the existing ground topography. During the design phase, more accurate information regarding the tailwater conditions and roadway profile will be available to the designer. The cross drains were analyzed using the Federal Highway Administration HY-8 (v. 7.30) cross drain modeling software. Additionally, CD-19 and CD-20 are equalizer pipes which connect two lobes of a depressional area that is being bisected by the proposed alignment alternative. During design, a more detailed analysis of these cross drains will be required. For the purpose of this study, CD-19 and CD-20 were sized considering the entire contributing areas for each depressional area as the total contributing area to each cross drain. For more information regarding the **Proposed Cross Drain Analysis** please refer to **Appendix C**.

4.2 Longitudinal & Transverse Floodplain Impacts

The project will impact the 100-year floodplain in three (3) different ways;

1) Longitudinal impacts resulting from filling the floodplain areas associated with proposed roadway widening within the Project Limits, isolated wetlands, wetland systems, and depressional areas.
2) Transverse impacts resulting from the extension and replacement of the existing cross drain culverts.
3) Transverse impacts resulting from widening of the bridge.

The longitudinal impacts cannot be avoided since the floodplains associated with the water bodies and depressional areas extend both east and west of US 301 within the study limits. The floodplain impact area was quantified based on the FEMA FIRMs, 100-year base flood elevation estimated as described in **Section 3.4** and the existing ground elevations from 1-foot LiDAR contours. To be conservative, it was assumed that any fill from the proposed roadway outside of the existing roadway was quantified as floodplain impacts.

The transverse impacts resulting from the extension or replacement of the culverts have not been analyzed in this report. To minimize upstream impacts, FDOT design criteria for conveyance systems (e.g. culverts) allow no significant rise in flood stages at the upstream end of the structures. During design, efforts should be made to ensure that proposed base headwater elevations do not surpass 0.1 feet of rise from the existing condition, and every necessary action should be taken to minimize upstream impacts.

A Bridge Hydraulics Report will be required during the design phase to evaluate the hydraulic impacts to Shady Brook associated with the bridge improvements as well as estimating scour depths of any proposed pilings.

4.3 Project Classification

The floodplain is located in a low density, non-urbanized area, and the encroachment area is classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement, but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Normally, these minimal efforts to address the impacts will consist of applying the Department's drainage design standards and following the Water Management District's procedures to achieve results that will not increase or significantly change the flood elevations and/or limits.

4.4 Risk Evaluation

There is no change in flood "Risk" associated with this project. The encroachments will not have a significant potential for interruption or termination of transportation facilities needed for emergency vehicles or used as an evacuation route. In addition, no significant adverse impacts on natural and beneficial floodplain values are anticipated and no significant impacts to highway users are expected.

4.5 PD&E Manual Requirements with Minimal Encroachment

Chapter 24 Floodplains of the FDOT's PD&E Manual, Part 2, defines four categories of encroachments as they pertain to base floodplain involvement; significant, minimal, none and no involvement, and also lists the report criteria corresponding to these encroachment categories. The FDOT has different requirements based on the category of encroachment. The proposed US 301 widening project was determined to have minimal encroachments and as a result, the requirements for this category are listed as follows:

1. The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed project improvements.
According to the City of Coleman, there are areas of flooding concern along US 301 near Mulberry Street and Florida Avenue. Floodplain Compensation areas will be constructed to mitigate loss of storage in the floodplain due to the project improvements. In addition, stormwater treatment areas are proposed to attenuate runoff. The project will have no adverse impact on the existing condition.

2. Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment an evaluation and discussion of practicable avoidance alternatives.
With the increase in the number of travel lanes proposed, there will be longitudinal and transverse impacts to the floodplain. Longitudinal impacts will be minimized by utilizing the maximum allowable roadway embankment slope.

The transverse floodplain impacts from the project occur due to the extension or replacement of the existing cross drains and widening of the bridge structure. The impacts at these locations are not analyzed during this study and will need to be addressed during the design phase.

The existing roadway bisects the floodplain. There are no economically feasible avoidance alternatives.

3. The practicability of avoidance alternatives and/or measures to minimize impacts.
The project will take every effort to minimize floodplain impacts resulting from the roadway fill. The maximum allowable roadway embankment slope will be used within the floodplain area to minimize the floodplain impacts.

4. Impact of the proposed improvements on emergency services and evacuation.
The proposed cross drains and bridge will perform hydraulically in a manner equal to or greater than the existing condition, and backwater elevations are not expected to increase. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes.

5. Impacts of the proposed improvement on the base flood, likelihood of flood risk, overtopping, location of overtopping, backwater, etc.
The proposed cross drains and bridge will perform hydraulically in a manner equal to or greater than the existing condition. As a result, there will be no significant change in flood risk or overtopping.

6. Determination of the impact of the proposed improvements on regulatory floodways, if any, and documentation of coordination with FEMA and local agencies to determine the project's consistency with the regulatory floodway.

There is no involvement with regulatory floodways on this project.

7. The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values (this information may also be addressed as part of the wetland impact evaluation and recommendations).
   Addressed as part of the Natural Resource Evaluation Report.

8. Consistency of the proposed improvements with the local floodplain development plan or the land use elements in the Comprehensive Plan, and the potential impacts of encouraging development within the 100-year base floodplain.
   The project will remain consistent with local floodplain development plans. The project will not support base floodplain development that is incompatible with existing floodplain management programs.

9. A map showing project, location and impacted floodplains. Provide copies of all applicable FIRM maps should be included within the final LHR report appendix.
   See Figure 6 in Appendix A and Figure 3-1.

10. Results of any and all project risk assessments performed.
    The proposed cross drain, bridge culverts and bridges will perform hydraulically in a manner equal to or greater than the existing condition. As a result, there will be no significant change in flood risk.

5.0 Conclusion and Recommendations

The modification to the drainage structures included in the project will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. Replacement drainage structures for this project are limited to hydraulically equivalent structures. An alternative encroachment location is not considered in this category as it defeats the project purpose or is economically unfeasible. Flooding conditions in the project area are inherent in the topography or are a result of other outside contributing sources. Mitigation of the existing flooding at the City of Coleman may be achieved by improving the existing storm sewer infrastructure near the flooding location and directing the runoff to the nearby outfall or to a proposed stormwater pond site that is being evaluated as part of this study. The proposed structures should be hydraulically equivalent to or greater than the existing structures, and backwater surface elevations are not expected to increase. As a result, the project will not affect existing flood heights or floodplain limits. This project will not result in any new or increased adverse environmental impacts. There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that these encroachments are not significant.